

### Patent Claims

1. Process for the preparation of mono(fluoroalkyl)- or bis(fluoroalkyl)phosphoric acid, mono(fluoroalkyl) or bis(fluoroalkyl) phosphates and the corresponding phosphoranes thereof, comprising at least the reaction of a bis(fluoroalkyl)phosphinic acid or a (fluoroalkyl)phosphonic acid or a corresponding derivative or salt of these acids with anhydrous hydrogen fluoride.
2. Process according to Claim 1, characterised in that use is made of a bis(fluoroalkyl)phosphinic acid or a corresponding derivative in which the two fluoroalkyl groups are identical or different.
3. Process according to Claim 1 or 2, characterised in that use is made of a bis(perfluoroalkyl)phosphinic acid or a (perfluoroalkyl)phosphonic acid or a corresponding derivative of these acids in which the perfluoroalkyl groups contain 1 to 20 C atoms and are straight-chain or branched.
4. Process according to one or more of Claims 1 to 3, characterised in that the derivative of bis(fluoroalkyl)phosphinic acid or (fluoroalkyl)phosphonic acid employed is the salt with a mono-, di- or trivalent metal cation.
5. Process according to Claim 4, characterised in that the mono-, di- or trivalent metal cation is selected from the group  $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Cu}^{2+}$  or  $\text{Al}^{3+}$ .

6. Process according to one or more of Claims 1 to 3,  
characterised in that the derivative of bis(fluoroalkyl)phosphinic acid or (fluoroalkyl)phosphonic acid employed is the salt with a mono- or divalent organic cation.
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7. Process according to Claim 6,  
characterised in that the mono- or divalent organic cation is selected from the group tetraalkylammonium, tetraalkylphosphonium, triarylalkylphosphonium, guanidinium, pyrrolidinium, pyridinium, imidazolium, piperazinium or hexamethylenediammonium.
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8. Process according to one of Claims 1 to 3,  
characterised in that the derivative of bis(fluoroalkyl)phosphinic acid or (fluoroalkyl)phosphonic acid employed is an ester of bis(fluoroalkyl)phosphinic acid or (fluoroalkyl)phosphonic acid.
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9. Process according to one or more of Claims 1 to 3,  
characterised in that the derivative of bis(fluoroalkyl)phosphinic acid or (fluoroalkyl)phosphonic acid employed is the salt with a polycation.
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10. Process according to Claim 9,  
characterised in that the polycation is selected from the group of polyammonium cations.
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11. Process according to one or more of Claims 1 to 10,  
characterised in that the reaction is carried out in a polar solvent or without a solvent.
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12. Process according to one or more of Claims 1 to 11,  
characterised in that the reaction is carried out at a temperature of -20°C to 100°C.
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13. Process according to one or more of Claims 1 to 12,  
characterised in that the reaction is carried out with 4- to 100-  
fold the molar amount of hydrogen fluoride.

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14. Process for the preparation of phosphoranes according to one or  
more of Claims 1 to 13,  
characterised in that the mono- or bis(fluoroalkyl) phosphate  
formed after the reaction with hydrogen fluoride is reacted with a strong  
electrophilic reagent or a strong Lewis acid.

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15. Process according to Claim 14,  
characterised in that the reaction is carried out with an elec-  
trophilic reagent or a Lewis acid selected from the group  $(\text{CH}_3)_3\text{SiCl}$ ,  
 $\text{SO}_2\text{Cl}_2$ ,  $\text{SbF}_5$ ,  $\text{AlCl}_3$ ,  $\text{VF}_5$ ,  $\text{SbCl}_5$ ,  $\text{NbF}_5$ ,  $\text{AsF}_5$ ,  $\text{BiF}_5$ ,  $\text{AlF}_3$  and  $\text{TaF}_5$ .

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